What is claimed is:

1. A composite material, comprising:

a matrix phase comprising silicon carbide;

a phase distributed throughout said matrix phase comprising silicon having dissolved therein at least one substance comprising boron; and

a reinforcement phase comprising boron carbide, said reinforcement phase also distributed throughout said matrix phase, said boron carbide being substantially unaffected by said silicon.

2. The composite material of claim 1, produced by a process comprising

providing a molten infiltrant comprising said silicon having dissolved therein at least one of said carbon and said boron; and

infiltrating said molten infiltrant into a porous mass comprising said boron carbide.

3. A ballistic armor, comprising:

at least one body having a front face and a rear face, the front face being the surface upon which a ballistic projectile impinges on said plate, the body comprising a composite material having a hardness of at least about 1100 kg/mm^2 as measured with a Vickers indenter using a 1 kilogram load, the composite material further comprising

(a) a matrix comprising silicon carbide crystallites, wherein at least about 90 volume percent of crystallites of said silicon carbide are smaller than about 100 microns in diameter;

(b) at least 65 percent by volume of a reinforcement phase comprising at least one filler material comprising boron carbide dispersed throughout said matrix; and

(c) an infiltrant phase comprising silicon dispersed throughout said matrix.

4. The ballistic armor of claim 3, wherein said at least one filler material comprises a plurality of crystallites, and further wherein at least 90 volume percent of said filler material crystallites are smaller than about 100 microns in diameter.

5. The ballistic armor of claim 3, wherein said infiltrant phase has dissolved therein at least one substance comprising boron.

6. The ballistic armor of claim 3, wherein said composite material comprises no more than about 30 percent by volume of said infiltrant phase.

7. The ballistic armor of claim 3, wherein said matrix comprises no more than about 24 percent by volume of silicon carbide produced in-situ.

8. The ballistic armor of claim 4, wherein substantially all of said filler material crystallites are smaller than about 106 microns in diameter.

9. The ballistic armor of claim 4, wherein substantially all of said filler material crystallites are smaller than about 90 microns in diameter.

10. The ballistic armor of claim 4, wherein at least 90 volume percent of said filler material crystallites are smaller than about 55 microns in diameter.

11. The ballistic armor of claim 4, wherein at least 85 volume percent of said filler material crystallites are smaller than about 75 microns in diameter.

12. The ballistic armor of claim 4, wherein at least 97 volume percent of said filler material crystallites are smaller than about 70 microns in diameter.

13. A ballistic armor, comprising a generally plate-shaped body, the body comprising:

a composite material comprising

(a) a reinforcement phase comprising boron carbide;

(b) a matrix comprising silicon carbide; and

(c) no more than about 30 percent by volume of an infiltrant phase comprising silicon dispersed throughout said matrix phase,

the body furthermore having a mass efficiency of at least about 4.1 when tested under the following conditions:

- 7.62 mm projectile
- SpectraShield® polymer composite backing material
- total armor system areal density of about 29 kg/m2
- outer tactical vest simulant comprising 28 plies of KM2 (600 denier) blanket comprising rip-stop nylon.

15. The ballistic armor of claim 13, wherein said body has a four-point flexural strength of at least about 200 MPa.

16. The ballistic armor of claim 13, wherein said body has a four-point flexural strength of at least about 260 MPa.

17. The ballistic armor of claim 13, wherein substantially all of said boron carbide is smaller than 45 microns in crystallite size.

18. The ballistic armor of claim 13, wherein said body has a hardness of at least about 1670 kg/mm^2 as measured with a Vickers indenter using a 1 kg load.

19. The ballistic armor of claim 18, wherein said composite material further comprises at least 70 percent by volume of said boron carbide.

20. The ballistic armor of claim 13, wherein at least said matrix and said at least one filler material comprises crystallites, and further wherein no more than about 10 percent of the total volume of said crystallites are larger than about 100 microns in diameter.

21. The ballistic armor of claim 13, wherein said infiltrant phase has dissolved therein at least one substance comprising boron.

22. The composite material of claim 1, wherein said composite material comprises no more than about 30 percent by volume of said infiltrant phase.

23. The composite material of claim 1, wherein substantially all of said filler material crystallites are smaller than about 106 microns in diameter.

24. The composite material of claim 1, wherein at least 90 volume percent of said filler material crystallites are smaller than about 55 microns in diameter.

25. the composite material of claim 1, wherein said boron carbide makes up at least 65 percent by volume of said composite material.

29. The ballistic armor of claim 32, wherein said infiltrant phase has dissolved therein at least one source of boron.

31. The ballistic armor of claim 13, further comprising a ballistic stopping power of at least 90 % that of armor grade boron carbide when tested under the following conditions:

- 7.62 mm projectile
- SpectraShield® polymer composite backing material
- total armor system areal density of about 30 kg/m^2
- an outer tactical vest simulant comprising 28 plies of KM2 (600 denier) blanket having rip-stop nylon
- armor grade boron carbide plate thickness of about 0.69 cm.

32. The ballistic armor of claim 3, further comprising a backing layer contacting said rear face of said at least one body.

38. The ballistic armor of claim 32, wherein said composite material comprises reaction-bonded boron carbide.

41. The ballistic armor of claim 32, wherein said composite material comprise at least 65 percent by volume of said filler material.

44. The ballistic armor of claim 32, wherein said backing layer comprises at least one fiber-reinforced plastic material.

45. The ballistic armor of claim 44, wherein said fiber comprises at least one material selected from the group consisting of polyethylene, aramid and glass.

50. The method of claim 51, wherein said preform is produced by a liquid-phase processing technique.

51. A method for making a composite body, comprising:

providing a porous mass or preform comprising at least one carbon source other than boron carbide, and at least one filler material comprising boron carbide;

providing a molten infiltrant comprising silicon having dissolved therein at least one substance comprising boron;

then, in a vacuum or inert atmosphere, contacting said molten infiltrant to at least one of said porous mass or preform;

infiltrating said molten infiltrant into said porous mass or preform, and reacting said silicon with said carbon source to form silicon carbide; and

continuing said infiltrating and reacting at least until said formed silicon carbide forms an at least partially interconnected structure.

52. The method of claim 51, wherein said molten infiltrant contains at least some dissolved boron prior to contact with said porous mass or preform comprising boron carbide.

53. The method of claim 51, wherein an amount of said dissolved boron is sufficient to suppress reaction of said silicon with said boron carbide.

54. The method of claim 51, wherein said infiltrating is conducted at a temperature no greater than about 2000°C.

55. The method of claim 51, wherein said infiltrating is conducted at a temperature in the range of about 1450°C to about 1650°C.

56. The method of claim 51, wherein said carbon source makes up no more than about 10 percent of a bulk volume of said porous mass.